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PIC/TP-7/60

December 1960

TECHNICAL PUBLICATION

CAMERA INFORMATION FOR KEYHOLE MISSION 9013

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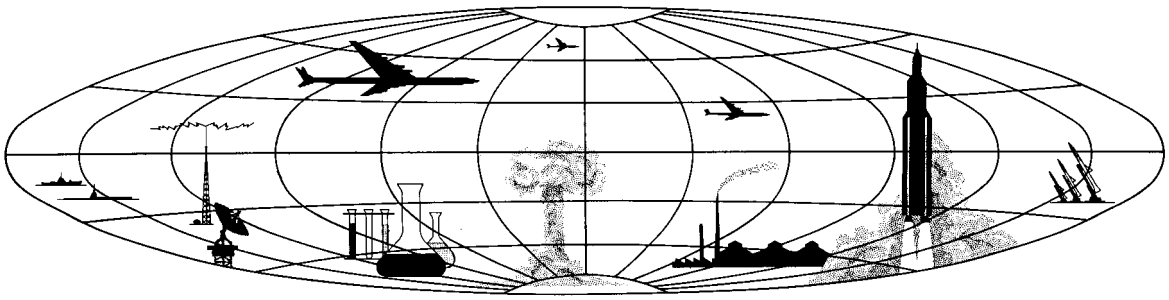

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CAMERA INFORMATION
FOR KEYHOLE MISSION 9013

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CAMERA INFORMATION FOR KEYHOLE MISSION 9013

This publication presents the technical information necessary for the reduction of quantitative data obtained from photography of Mission 9013. This photography involves the use of three cameras: a main camera, a port horizon camera, and a starboard horizon camera.

1. Operational Focal Lengths

A.	Main lens	23.990 inches
B.	Port horizon lens	89.30 mm
C.	Starboard horizon lens	89.25 mm

Definition: "Operational focal length" is defined as the distance from the main lens nodal point to the film surface as measured on the lens bench, and the data reduced for a vacuum condition. (Operational focal length is equivalent focal length corrected for environment).

2. Lens Distortion

A. Main lens -- at 3° radial, less than five microns.

B. Port horizon lens -- at 10° radial, .003 mm; at 20° radial, .038 mm.

C. Starboard horizon lens -- at 10° radial, .001 mm; at 20° radial, .025 mm.

3. Depression Angle of Horizon Cameras

A.	Port horizon camera	15° 04'
B.	Starboard horizon camera	15° 12'

4. Image Motion Compensation

Image motion compensation (IMC) provided on Mission 9013 was different from that provided on Mission 9009. Whereas the IMC on Mission 9009 was a constant velocity, the IMC on Mission 9013 changes continuously throughout each pass. The change in IMC velocity is a linear function of time. The linear change in the IMC velocity is coupled to a 15 minute clock which recycles in time for the next pass.

Scan velocity - therefore IMC velocity - can be determined by counting the timing "pips". IMC step 3 was used throughout this mission. (The clock is activated prior to camera operation; however, the lead time has not been determined.)

Camera Cycle Time (sec)

Start of 15 minute clock	3.64
At end of 15 minutes	2.18

Scan Velocity (in/sec)

Start of 15 minute clock	47.29
At end of 15 minutes	78.88

IMC Velocity (in/sec)

Start of 15 minute clock	.519 Cos θ
At end of 15 minutes	.866 Cos θ

Where θ is the displacement (expressed in degrees of arc) normal to the flight direction.

5. Filter and Exposure Data

A. Main lens - filter, Wratten 21; aperture, f/5; exposure, 1/1,000 second.

B. Horizon lenses - filter, Wratten 25; aperture, f/8; exposure, 1/200 second.

6. Resolution Capabilities

A. Main lens -- at zero degrees, 115 lines per mm; at 18°, 109 lines per mm.

B. Port horizon lens -- at zero degrees, 54 lines per mm; at 15°, 45 lines per mm.

C. Starboard horizon lens -- at zero degrees, 53 lines per mm; at 15°, 37 lines per mm.

7. Timing Pulses

There are 160 pulses per second. These timing "pips" imaged on the frame make possible the determination of scan velocities and IMC velocities for any frame.